

EXHIBIT 4

**IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS EASTERN DIVISION**

In re Groupon, Inc. Securities
Litigation

)
)
)
)
)
)
)
)

Master File No. 12-CV-2450

Hon. Charles R. Norgle

Hon. Mary M. Rowland

AFFIDAVIT OF GEORGIOS ZERVAS

Georgios Zervas, on oath states as follows:

1. I am an Assistant Professor of Marketing at Boston University Questrom School of Business and a Junior Faculty Fellow of the Hariri Institute. Previously, I was a Simons Postdoctoral Fellow at Yale University and an Affiliate at the Center for Research on Computation and Society (CRCS) at Harvard University. I completed my Ph.D. in 2011 in Computer Science at Boston University. I am broadly interested in problems lying in the intersection of marketing, computer science, and economics, and a lot of my work has focused on large scale empirical studies of internet markets.

2. In 2012, I wrote a draft report entitled "The Evolving Quality of Groupon Deals (Draft)" (the "Report").¹

¹ Zervas, Georgios. "The Evolving Quality of Groupon Deals (Draft)." (2012). Available at <http://people.bu.edu/zg/publications/Zer12.pdf>

3. It was recently brought to my attention by counsel for Groupon in this litigation that my Report was used by Professor Utpal Dholakia in support of the proposition that the quality of merchants participating in Groupon deals declined during 2011. Groupon's counsel asked me to review and react to Prof. Dholakia's use of my Report and offered to compensate me for my time in doing so. This affidavit sets out my opinions and the bases for them, and is based upon my review of Prof. Dholakia's report and the materials cited in this affidavit. I have spent 8 hours in review and preparation of this affidavit and expect to be compensated at my normal consulting rate of \$400/hour.

4. Prof. Dholakia uses my report as one of two pieces of evidence (the other being a Groupon slide deck I have not seen) to reach the following conclusion:

“33. Based on this information from the Groupon slide deck and external studies, I concluded that the quality of merchants running Groupon deals and the quality of deals offered by Groupon declined during 2011 despite Groupon's statement that they exercised rigorous merchant quality control.”

5. In short, while the data I present in my Report could in principle be consistent with a decline in Groupon merchant quality, Prof. Dholakia's conclusion “that external sources of information also supported this finding” cannot be established using my findings alone. To reiterate the conclusion of my 2012 Report: “[W]ithout understanding the underlying causes of this trend [referring to decline of Groupon merchant Yelp ratings] it is impossible to evaluate its implications for the daily deals business model.”

6. In my report, I highlight at least three reasons that Groupon merchant Yelp ratings were declining, though there could be more. Crucially, my Report does not attempt distinguish among these reasons. First, as pointed out by Prof. Dholakia, maybe Groupon could not attract merchants with high Yelp ratings. Second, I argue that maybe as Groupon was expanding the number of deals it was offering it had to also work with some businesses that had lower Yelp ratings. As I show in my Report, the number of deals Groupon offered increased substantially during 2011. Third, the observed decline in Groupon merchant Yelp ratings could in fact have nothing to do with Groupon: maybe the Yelp ratings of non-Groupon merchants were also declining for reasons unrelated to the case. This observation suggests that, in the very least, to establish that Groupon merchant quality was declining over time we should compare the Yelp ratings of Groupon merchants to the Yelp ratings of an appropriately chosen control group of non-Groupon merchants over the same period of time.

7. The third point in the previous paragraph bears particular significance because other academic work has found that as businesses (or products, or movies) receive more reviews their average rating tends to decline.^{2, 3, 4} Therefore, the analysis I

² Li, Xinxin, and Lorin M. Hitt. "Self-selection and information role of online product reviews." *Information Systems Research* 19.4 (2008): 456-474.

³ Godes, David, and José C. Silva. "Sequential and temporal dynamics of online opinion." *Marketing Science* 31.3 (2012): 448-473.

⁴ Luca, Michael, and Georgios Zervas. "Fake it till you make it: Reputation, competition, and Yelp review fraud." *Harvard Business School NOM Unit Working Paper* 14-006 (2013).

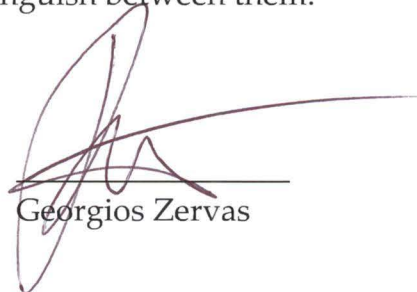
present in my Report is also consistent with Groupon working with more mature merchants, who have more reviews, and, therefore, maybe lower ratings. Here, it is also worth pointing out that the number of reviews a business has is a salient characteristic on Yelp's website, and it could also be perceived as a signal of quality: high quality businesses attract more customers, and therefore, more Yelp reviewers too. As Prof. Dholakia points out "common methods in the daily deal industry to vet merchants includes restricting merchants with a certain minimum tenure." Longer tenure likely implies more Yelp reviews, and potentially a lower Yelp rating. But again, I warn the reader against drawing any particular inferences on the underlying drivers of the observed decline in Groupon-merchant Yelp ratings solely based on the correlations I present in my Report.

8. An overarching concern with relying exclusively on Yelp star-ratings to measure merchant quality relates to the various sources of bias inherent in any crowdsourced reviews system. For instance, in a different report I find that exactly the same hotels are rated approximately 0.3 stars lower on TripAdvisor than on Expedia.⁵ This finding highlights that crowdsourced reviews are a reflection of the unique tastes and perceptions of the consumers that write them as much as they are of underlying business quality.

⁵ Proserpio, Davide, and Georgios Zervas. "Online reputation management: Estimating the impact of management responses on consumer reviews." *Available at SSRN* (2014). Available at http://papers.ssrn.com/sol3/Papers.cfm?abstract_id=2521190

9. My coauthors and I have specifically studied the tastes and perceptions of Groupon customers.⁶ We found that Groupon customers tend to leave significantly lower Yelp ratings (approximately half a star lower) than other Yelp users. This suggests yet another process that could in theory explain why Groupon merchant ratings were declining in 2011: merchants offering repeat Groupon deals could see their Yelp rating decline as a consequence of attracting these more stringent reviewers.

10. To conclude, I see Prof. Dholakia's use of my Report to support the conclusion that Groupon merchant quality was declining in 2011 as an overstatement of my results. There exist multiple reasons why Groupon-merchant Yelp ratings could be declining. My Report does not attempt to distinguish between them.



Georgios Zervas

Subscribed and sworn to before me
this 21st day of December, 2015.



Notary Public



CARL JANEY
NOTARY PUBLIC
COMMONWEALTH OF MASSACHUSETTS
MY COMMISSION EXPIRES
MAY 25, 2018

⁶ Byers, John W., Michael Mitzenmacher, and Georgios Zervas. "The Groupon effect on Yelp ratings: a root cause analysis." In *Proceedings of the 13th ACM conference on Electronic Commerce*, pp. 248-265. ACM, 2012.